

processing module 62. At step 642, fast decision beam selection module 408 determines a fast decision beam selection 440 based on the traffic signals (which may include a training sequence) received in the first frame. In particular, fast decision beam selection module 408 may determine fast decision beam selection 440 substantially in real time. At step 644, smart decision beam selection module 410 determines a smart decision beam selection 620 based on the traffic signals received in the first frame. At step 646, the traffic signals received in the first frame are communicated to base station transceiver 24 via the beam selected as fast decision beam selection 440. The determination of smart decision beam selection 620 at step 644 may not be completed until after the traffic signals are communicated to base station transceiver 24 at step 646.

[0248] At step 648, mobile station 15 transmits additional traffic signals in a second frame of the assigned traffic channel, which are received by receiving system 100 and communicated to processing module 62. At step 650, fast decision beam selection module 408 determines a fast decision beam selection 440 based on the traffic signals received in the second frame. At step 652, smart decision beam selection module 410 determines a smart decision beam selection 620 based on the traffic signals received in the second frame along with signals received in one or more frames prior to the second frame (which may or may not include the first frame). At step 654, it is determined whether the smart decision beam selection 620 determined at step 644 meets a particular criteria. For example, in one embodiment it is determined whether the quality of smart decision beam selection 620 determined at step 644 meets a particular threshold. If it is determined that the smart decision beam selection 620 determined at step 644 does meet the particular criteria, at step 656 the traffic signals received in the second frame are communicated to base station transceiver 24 via the beam selected as smart decision beam selection 620 at step 644. If it is determined that the smart decision beam selection 620 determined at step 644 does not meet the particular criteria, at step 658 the traffic signals received in the second frame are communicated to base station transceiver 24 via the beam selected as fast decision beam selection 440 at step 650.

[0249] Steps 648 through 658 may be repeated one or more times. In particular, steps 648 through 658 may be repeated in order to continually update smart decision beam selection 620 during the remainder of the call. In addition, in some situations, steps 640 through 646 may be repeated one or more times before using a smart decision beam selection 620. In particular, steps 640 through 646 may be repeated one or more times until smart decision beam selection module 410 has sufficient data to determine an adequate smart decision beam selection 620.

[0250] Smart antenna system 14 may provide a number of advantages. For example, in some embodiments, smart antenna apparatus 16 may be coupled to a new or existing base station transceiver as an add-on or applique without having to modify, alter, or reconfigure the base station transceiver or any other component of the base station system, such as base station controllers. Thus, the cost and labor of modifying or altering base station system 12 and/or dealing or negotiating with the manufacturer of the components of base station system 12, such as base station transceiver 24 and base station controller 26, is eliminated in

some embodiments. Moreover, smart antenna apparatus 16 may be compatible with base station transceivers produced by a variety of manufacturers. For example, smart antenna apparatus 16 may be compatible with all base station transceivers using standard base station transceiver interfaces. For at least the reasons discussed above, the installation costs of smart antenna apparatus 16 are reduced as compared with traditional smart antenna systems. Moreover, the operating costs of smart antenna apparatus 16 are reduced as compared with traditional smart antenna systems.

[0251] In addition, the presence and operation of smart antenna apparatus 16 may be transparent to the base station system, including the base station transceiver. In other words, smart antenna apparatus 16 causes little delay (and in some embodiments, no delay) in the reception and transmission of radio signals to and from the base station transceiver. Thus, smart antenna apparatus 16 may operate without affecting the timing of the cellular network or any mobile stations.

[0252] In addition, the beam selection systems and methods provided by smart antenna apparatus 16 as described above with reference to FIGS. 11 through 23 may provide a number of advantages. For example, smart antenna apparatus 16 may reduce the interference, such as multi-path and co-channel interference, associated with uplink signals received by a new or existing base station transceiver. In addition, smart antenna apparatus 16 may reduce the interference associated with downlink signals received by mobile stations. Thus, smart antenna apparatus 16 may increase the effective capacity and improve the overall performance of the base station transceiver without requiring any modifications to the base station transceiver. For example, since using narrow beams generally increases the range (or coverage) of effective reception and transmission as compared with wide beams; smart antenna apparatus 16 may increase the range of the base station transceiver to which it is added. Moreover, smart antenna apparatus 16 may improve the signal-to-noise ratio (SNR) of transmitted and/or received signals, and thus increases the data rate which may be transmitted and/or received by the base station transceiver.

[0253] In some embodiments, smart antenna apparatus 16 may reduce the interference associated with received and/or transmitted signals better than traditional smart antenna systems. As a result, smart antenna apparatus 16 may provide increased capacity, coverage, and efficiency as compared with traditional smart antenna systems.

[0254] Although embodiments of the invention and their advantages are described in detail, a person of ordinary skill in the art could make various alterations, additions, and omissions without departing from the spirit and scope of the present invention as defined by the appended claims.

1-57. (canceled)

58. A method, comprising:

- receiving one or more uplink beams at one or more receivers;
- analyzing at least some of the one or more uplink beams;
- selecting at least one uplink beam from the one or more uplink beams; and
- switching to the selected uplink beam.